

ABSTRACT OF THE DISCLOSURE

A method for controlling and positioning a two-dimensional electric motor in six degrees of freedom is disclosed. The electric motor has a coil array and a magnet array. The method controls the motor in six degrees of freedom. The method includes: determining currents for generating the desired forces in a first, second and third direction, the first and second directions being defined in a plane in which the magnets are disposed and the third direction being generally orthogonal to the first and second directions, determining a resultant torque about the first, second, and third directions that would be generated from applying the determined currents, determining current adjustments to compensate for the resultant torque, and applying a current equal to the sum of the determined currents and the current adjustments to the coils to interact with the magnetic fields of the magnet array. The currents are applied only to the portion of the coil array within the magnetic field of the magnet array, including those coils which are only partially within the magnetic field of the magnet array. The method of the invention may be used in applications such as positioning wafers in semiconductor fabrication.